WHAT IS CLAIMED IS:

1. A method of converting glycerol to 1,3-propanediol in a thermophilic organism, the method comprising:

providing a thermophilic organism that ferments glycerol to 1,3-propanediol; and

culturing the thermophilic organism under conditions such that 1,3-propanediol is produced.

2. The method of Claim 1, further comprising the step of collecting 1,3-propanediol produced by the thermophilic organism.

3. The method of Claim 2, further comprising the step of polymerizing the 1,3-propanediol into a polymer.

4. The method of Claim 3, wherein the polymer is poly(1,3-propylene terephthalate) (PPT).

5. The method of Claim 1, wherein the thermophilic organism is *Caloramator viterbiensis*.

6. The method of Claim 5, wherein the thermophilic organism is derived from the organism deposited as ATCC designation PTA-584.

7. A method of producing 1,3-propanediol from glycerol, the method comprising:

incubating glycerol with a thermostable dehydratase enzyme, thereby converting the glycerol to 3-hydroxypropionaldehyde; and

adding a reducing agent capable of reducing 3-hydroxypropionaldehyde to 1,3-propanediol.

8. The method of Claim 7, wherein the reduction of the 3-hydroxypropionaldehyde to 1,3-propanediol is catalyzed by a thermostable 1,3-propanediol oxidoreductase.

9. The method of Claim 7 or 8, further comprising the step of collecting 1,3-propanediol.

10. The method of Claim 9, further comprising the step of polymerizing the 1,3-propanediol into a polymer.

11. The method of Claim 10, wherein the polymer is poly(1,3-propylene terephthalate) (PPT).

12. The method of Claim 8, wherein the thermostable dehydratase enzyme is derived from a thermophilic organism.

13. The method of Claim 12, wherein the thermophilic organism is *Caloramator viterbiensis*.

14. The method of Claim 12, wherein the thermophilic organism is derived from the organism deposited as ATCC designation PTA-584.

15. An isolated thermostable glycerol fermentation enzyme that is derived from *C. viterbiensis*.

16. An isolated thermostable glycerol fermentation enzyme that is derived from the organism deposited as ATCC designation PTA-584.

17. An isolated thermostable glycerol fermentation enzyme that is homologous to a thermostable glycerol fermentation enzyme derived from *C. viterbiensis*.

18. The isolated thermostable glycerol fermentation enzyme of Claim 11, 12 or 13 that is a dehydratase.

19. The enzyme of Claim 18 that is glycerol dehydratase.

20. The enzyme of Claim 15, 16 or 17 that is 1,3-propanediol oxidoreductase.

21. An isolated culture or cell of *Caloramator viterbiensis*..

22. The isolated culture or cell of Claim 21, wherein the genome of the culture or cell is at least 95% identical to the genome of the organisms deposited as ATCC designation PTA-584.

23. The isolated culture or cell of Claim 21, wherein the genome of the culture or cell is at least 99% identical to the genome of the organisms deposited as ATCC designation PTA-584.

24. The isolated culture or cell of Claim 21, wherein the 16S rDNA sequence of the culture or cell is at least 95% identical to the 16S rDNA of the organisms deposited as ATCC designation PTA-584.

25. The isolated culture or cell of Claim 21, wherein the 16S rDNA sequence of the culture or cell is at least 99% identical to the 16S rDNA of the organisms deposited as ATCC designation PTA-584.

26. The isolated culture or cell of Claim 21 that is a progeny of the organisms deposited as ATCC designation PTA-584.

27. A method of cloning a polynucleotide sequence that encodes a thermostable glycerol fermentation enzyme, the method comprising:

hybridizing a polynucleotide probe homologous to a portion of a known glycerol fermentation enzyme gene to a polynucleotide molecule from an environmental sample suspected of containing a thermophilic organism; and

isolating a polynucleotide sequence that binds to the polynucleotide probe.

28. The method of Claim 27, wherein a polymerase chain reaction using a second polynucleotide probe is used to amplify the polynucleotide sequence that binds to the polynucleotide probes.

29. The method of Claim 27 or 28, wherein the thermostable glycerol fermentation enzyme is derived from a thermophilic organism identified as fermenting glycerol to 1,3-propanediol.

30. The method of Claim 29, wherein the thermophilic organism is *Caloramator viterbiensis*.

31. The method of Claim 30, wherein the polynucleotide probe is homologous to a portion of a known dhaB gene.

32. The method of Claim 31, wherein the dhaB gene is from *Klebsiella*.

33. The method of Claim 29, wherein at least one polynucleotide probe is selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:5 and SEQ ID NO:6.

34. The method of Claim 33, wherein the polynucleotide probe and the second polynucleotide probe are SEQ ID NO:1 and SEQ ID NO:2.

35. The method of Claim 33, wherein the polynucleotide probe and the second polynucleotide probe are SEQ ID NO:5 and SEQ ID NO:6.

36. A method of cloning a polynucleotide sequence that encodes a thermostable glycerol fermentation enzyme, the method comprising:

transforming a target organism that cannot grow anaerobically on glycerol with DNA from a thermophilic organism; and

identifying those transformed target organisms that contain the polynucleotide sequence that encodes an enzyme that ferments glycerol to 1,3-propanediol by their anaerobic growth on glycerol.

37. The method of Claim 36, wherein the thermostable glycerol fermentation enzyme is derived from a thermophilic organism identified as fermenting glycerol to 1,3-propanediol.

38. The method of Claim 37, wherein the thermophilic organism is *Caloramator viterbiensis*.

39. The method of Claim 38, wherein the *Caloramator viterbiensis* is derived from the organism deposited as ATCC designation PTA-584.

40. A method of isolating a thermophilic organism that catalyzes the fermentation of glycerol to 1,3-propanediol, the method comprising:

incubating a sample containing thermophilic organisms in media containing glycerol as the primary carbon source; and

isolating at least one thermophilic organism that ferments glycerol into 1,3-propanediol.

41. The method of Claim 40, wherein the sample is incubated at a temperature in the range of about 40°C to about 100°C.

42. The method of Claim 40, wherein the sample is incubated under anaerobic conditions.

43. The method of Claim 40, wherein the sample is obtained from a natural source having a temperature of between about 50° to about 100°C.

44. The method of Claim 40, further comprising the step of detecting production of 1,3-propanediol by the thermophilic organism.

45. The method of Claim 40, further comprising the step of determining the production of acetate by the thermophilic organism.